

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 441 532 A3

(12)

EUROPEAN PATENT APPLICATION(21) Application number: **91300774.6**(51) Int. Cl.⁵: **H03B 9/14**(22) Date of filing: **31.01.91**(30) Priority: **08.02.90 US 476991****Los Angeles, CA 90045-0066(US)**(43) Date of publication of application:
14.08.91 Bulletin 91/33

(72) Inventor: **Poelker, John N.**
830 Hillview Circle
Simi Valley, California 93067(US)
Inventor: **Robertson, Ralston S.**
8411 Paso Robles
Northridge, California 91325(US)

(64) Designated Contracting States:
CH DE ES FR GB GR IT LI NL SE(68) Date of deferred publication of the search report:
18.12.91 Bulletin 91/51(71) Applicant: **HUGHES AIRCRAFT COMPANY**
7200 Hughes Terrace

(74) Representative: **Colgan, Stephen James et al**
CARPMAELS & RANSFORD 43 Bloomsbury
Square
London WC1A 2RA(GB)

(54) **A frequency linearization circuit for a microwave VCO in ridged waveguide.**

(57) A radial line, (top-hat) disc geometry in conjunction with a varactor diode (31) are disposed in a broadband, ridged waveguide oscillator circuit to produce a frequency linearized voltage controlled oscillator (10). A negative resistance device (24) is recessed into the ridged waveguide (11) and co-axially coupled via an impedance transformer to the ridged waveguide cavity (12). The present invention uses a disc resonator (32) in a ridged waveguide to transform the microwave impedance of a non-RF generating element, a varactor diode (31), to values which provide improved voltage controlled oscillator tuning linearity. The disc resonator (32) or radial line is located above the varactor diode (31). The radial line transforms the microwave impedance of the varactor diode to a new value which is then coupled into the ridged waveguide circuit and subsequently to the RF generating diode (24). The circuit impedance, which is a function of the varactor voltage, acts to linearize the frequency versus voltage characteristic of the diode. A comparison of the operation of the circuit with and without the radial line/tuning disc shows a 13:1 improvement in the frequency linearity. Experimental results show that the circuit configuration of the present invention is ideal for use in microwave and millimeter-wave voltage controlled oscillators which require inherent frequency versus voltage linearity. Since the voltage controlled oscilla-

tor frequency linearity is a critical factor in phase locked loop performance, it is especially suited for use in microwave and millimeter-wave radar or communication systems which are frequency agile.

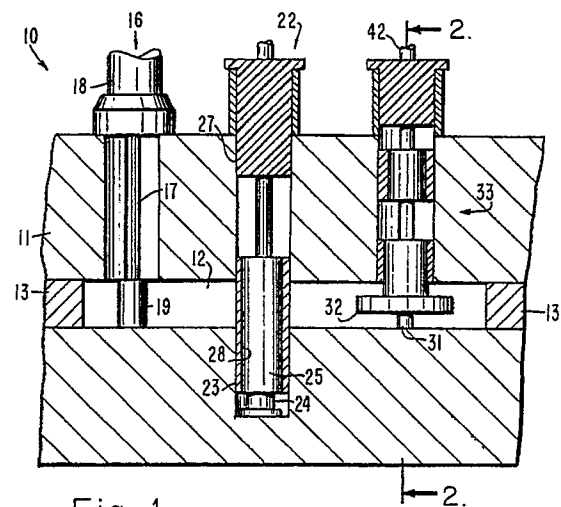


Fig. 1.

EP 0 441 532 A3



European
Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 30 0774

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	PATENT ABSTRACTS OF JAPAN vol. 4, no. 63 (E-10)(545) May 13, 1980 & JP-A-55 31 367 (FUJITSU K.K.) March 5, 1980 * the whole document *	1,4,7	H 03 B 9/14

A,D	EP-A-0 067 284 (HUGHES AIRCRAFT COMPANY) * page 4, line 26 - page 7, line 12; figures 1-3 & US-A-4 429 287 (ROBERTSON ET AL.) *	1,4,7	

A	EP-A-0 090 694 (THOMSON-CSF) * page 5, line 15 - page 8, line 9; figures 3,4 *	1,2,4,5,7, 8	

A	1971 INTERNATIONAL CONVENTION DIGEST March 22, 1971, NEW YORK pages 278 - 280; F. STERZER: 'PROGRESS IN GUNN DEVICES ' * page 278, paragraph 3; figure 3 *	1,4,7	

The present search report has been drawn up for all claims			
Place of search		Date of completion of search	Examiner
The Hague		08 October 91	BALBINOT H.
CATEGORY OF CITED DOCUMENTS			
X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention		E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons ----- &: member of the same patent family, corresponding document	